



FERTILIZER CANADA

FERTILISANTS CANADA

907 – 350 Sparks, Ottawa ON K1R 7S8

T (613) 230-2600 | F (613) 230-5142

info@fertilizercanada.ca

fertilizercanada.ca | fertilisantscanada.ca

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Impact of the Emerging Hydrogen Economy on the Fertilizer Industry

Fertilizer Canada members are among the largest producers and consumers of hydrogen in Canada as a critical component of ammonia production — the foundation for nitrogen. We represent manufacturers, wholesalers, and retail distributors of nitrogen, phosphate, potash, and sulphur, primarily used as fertilizers. Our industry contributes approximately \$24 billion annually to Canada's economic activity, supporting the employment of over 76,000 individuals throughout the supply chain, with the potential for economic growth if hydrogen is adopted as a lower-carbon fuel and ammonia as its carrier.

Our members are well positioned to continue contribution to Canada's hydrogen economy, and to help establish the role of nitrogen-based fertilizer production in the emerging hydrogen economy. Hydrogen production is the first step in the process to manufacture nitrogen-based products such as ammonia, which is more easily transported than hydrogen to reach export markets. Canadian producers have been recognized as global experts in safely producing, handling, and transporting ammonia to customers in North America for many decades. We have a high level of expertise to share with the government, and are looking forward to participating with both government and stakeholders alike in knowledge sharing opportunities.

Most nitrogen production facilities in North America utilize natural gas using steam methane reformation to produce the hydrogen needed in the ammonia process. Carbon dioxide is formed as a by-product and can be utilized downstream to produce urea – another important agricultural fertilizer – captured and sold or sequestered where infrastructure exists, or otherwise vented. Canadian ammonia producers and our upstream partners have made significant investments in improving the efficiency of our facilities. As a result, while Canadian ammonia production is energy intensive, it is far less so than production in other parts of the world which use coal for ammonia production. Given the government's expressed desire to build a strong hydrogen industry in Canada to support our clean energy transition, this emerging hydrogen market represents an opportunity to leverage ammonia as an existing source of hydrogen and help nitrogen producers lower global greenhouse gas emissions in other sectors.

Fertilizer Canada would like to take this time to better establish our industry's position on the current direction that Canada's hydrogen economy is moving, and how this developing economy impacts ammonia production across a wide range of issues and opportunities.

Stakeholder Support:

Before large-scale projects can begin, both Government and the private sector will need to make sure to work with indigenous nations, environmental groups, farm organizations and municipalities alike to build support for the production, storage, and transportation of ammonia as a hydrogen carrier. Canada is currently in the midst of mending, and forging newer, stronger, and more honest relationships with stakeholders throughout the country. It is critical that industry and government begin engaging all stakeholders and rightsholders in the hydrogen and ammonia arena and in the affected geographic areas immediately at the project inception stage, and not only at the project selling/implementation stage. This is critical in ensuring inclusion and a thorough scan of regulatory and infrastructure hurdles that exist and affect indigenous nations,



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local municipalities, and environmental groups. Oversight in this area can result in further fractured relationships, and significant transportation/technology implementation delays.

Ensuring Food and Fuel Security:

As potential applications for ammonia expand in the low-carbon economy, it will be important to ensure that all end users have access to a reliable, affordable ammonia supply. The production of granular urea for instance – the most significant fertilizer product globally – is carried out using CO₂ from ammonia production. Urea and urea-based fertilizers such as UAN account for over 50% of total nitrogen fertilizer applications in Canada. CO₂ being such a critical part of urea production, it is necessary to acknowledge and account for the role it plays in the production of nitrogen-based fertilizers and global food security.

A major policy issue for government is how to ensure cost-effective production of urea in a hydrogen economy. Additionally, the introduction of policies and tax credits intending to grow other markets must not inadvertently disrupt food security. As demand grows for clean ammonia for non-agricultural uses, targeted clean energy incentives must not disincentivize continued urea production. Further effort is required by government to assess how Canada can become a leader in low-carbon fuels production while maintaining domestic supply of the essential crop nutrients that drive Canadian agriculture and exports.

Incentivizing Decarbonization at Existing (Brownfield) Ammonia Production Facilities:

Government policies must enable projects that leverage opportunities in Canada's existing world-scale, modern and efficient ammonia production facilities that exist in four Canadian provinces. Brownfield emphasis and retrofitting will greatly help reduce the existing GHG footprint in Canada, which also compliments Canada's Paris agreement and 2050 targets. The best near-term option is the production of low-carbon ammonia based on proven carbon capture utilization and storage (CCUS). Many brownfield facilities already have critical infrastructure and technology in place for process emissions, which may enable retrofits to produce low-carbon ammonia on a shorter timeline than for greenfield facilities, which would have greater regulatory hurdles, construction timelines and other requirements. The significant red tape burden and advantages in other jurisdictions are some of the reasons why no new nitrogen facility in Canada has been established in over 30 years, and why incentivizing investments in existing nitrogen production facilities presents a favourable near-term pathway for decarbonization.

Infrastructure Support, Transportation Capacity, Safety, and Security:

A hydrogen economy, similar to other clean energy technologies, will require massive public-private investment in infrastructure outside the fence-line of ammonia production facilities. This will include CO₂ pipelines, expanded rail capacity and port export terminals. Government incentives and policies must create a level playing field with other jurisdictions such as the United States. Railways and ocean ports will have to commit to expand capacity to move new ammonia production to export position on the West and East Coasts. There are restrictions on the number and location of ammonia cars in a train, which limits capacity, and railways have not always supported shipment of dangerous goods such as ammonia due to liability and cost



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issues despite common carrier obligations. Ports will have to address local concerns about siting of ammonia terminals in urban settings.

The fertilizer industry has also been proactive in implementing a stewardship approach to handling ammonia and has partnered with the federal government to establish rigorous, industry-led codes of practice, meeting or exceeding existing regulations. These codes ensure the utmost safety when producing, storing, transporting, or using these products. Ascription to these codes is a mandatory condition of membership in Fertilizer Canada. It is imperative that all new hydrogen and ammonia production facilities that are established to support the emerging hydrogen market and who are less experienced in shipping ammonia ascribe to similar high standard codes to continue to uphold safety when shipping ammonia.

Timelines:

Canada needs a national plan to streamline the impact assessment process and shorten the timelines for approval of projects that contribute to Canada's climate and economic goals. The current hurdles for project assessment are onerous and have the potential to create lengthy delays in the establishment of a hydrogen economy. Government policies must be based on realistic time horizons for such a large-scale retooling of ammonia supply chains. Major projects related to ammonia as a carrier for hydrogen production can require upwards of a decade for financial approval, planning, environmental assessment, and construction. Environmental assessments alone can take years to complete, and are often the first step in greenlighting major projects.

Workforce Constraints:

Construction and maintenance of large-scale projects to enable hydrogen production from ammonia will require thousands of additional, highly skilled people in trades and professions such as engineering, welding, electrical, pipe fitting, heavy equipment, etc. There are reports that 80 per cent of major corporations are already struggling with labour shortages. Government policies regarding immigration and training will have to be introduced to fill this gap, and it is in turn important to account for both the short- and long-term adjustments that may need to be made from changing existing government policy.

Key Takeaways, Concerns, Comments:

1. First and foremost, Fertilizer Canada would like to reiterate the importance of early regulatory and infrastructure collaboration in this emerging hydrogen economy. Canada is currently in the midst of mending and forging newer, stronger, and more honest relationships with stakeholders throughout the country. It is critical that industry and government begin engaging all stakeholders and rightsholders in the hydrogen and ammonia arena and in the affected geographic area immediately at the project inception stage, and not only at the project selling/implementation stage. This is critical in ensuring inclusion and that a thorough scan of regulatory and infrastructure hurdles that exist and affect indigenous nations, local municipalities, and environmental groups takes place. Any oversight in this area can result in further fractured relationships, and significant transportation/technology implementation delays.
2. The Canadian government must invest in significant transportation infrastructure and support development of new markets for Canadian clean energy exports to ensure new ammonia production can reach its overseas customers and does not disrupt existing



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ammonia markets. Without those foundational pieces in place, there is a risk that new production could create ammonia price uncertainty within Canada.

3. As potential applications for ammonia expand in the low-carbon economy, it will be important to ensure that end users have access to a reliable, affordable ammonia supply to support food security without disrupting the fertilizer market. As demand grows for clean ammonia for non-agricultural uses, targeted clean energy incentives must not disincentivize continued urea production in the fertilizer industry, and thereby inadvertently impact food security.
4. The fertilizer industry's ability to decarbonize is strongly tied to Canada's existing policies, infrastructure, and commitments. Introducing new tax credits/policies that do not compliment or positively align with existing strategies runs the risk of allowing decarbonization in the fertilizer industry to fall behind the goals outlined in such agreements such as the current Paris Agreement by unintentionally creating conflicts between policy pieces, thus negatively impacting the overall fertilizer economy.
5. If new grants are made available, or new policy is implemented surrounding hydrogen production, it is important to make sure that there is equal opportunity across the board for facilities to access resources. A level playing field is imperative in fostering healthy economic development.
6. The fertilizer industry has partnered with the federal government to establish rigorous, industry-led codes of practice, meeting or exceeding existing regulations to ensure the utmost safety when producing, storing, transporting, or using these products. While it is not our objective to have all emerging industries ascribe to these specific codes, it is imperative that all new hydrogen and ammonia production facilities work to subscribe to the highest standard code of practice possible during the emergence of the hydrogen market. Subscription to extensive codes of practice will help ensure thorough industry safety.
7. Government policies must enable projects that leverage Canada's existing world-scale, modern, and efficient ammonia production facilities in four Canadian provinces. In order to decarbonize industry production, existing (brownfield) production should be aided and emphasized as a potential pathway to accelerate clean ammonia production at a time when resources for new facilities may be constrained (i.e. transportation, technology, sequestration).
8. Finally, when considering the carbon intensity of hydrogen and ammonia production, government policies should ensure not to inadvertently discriminate against certain types of ammonia production. All carbon intensity processes, whether blue or green ammonia production or low carbon production as a whole, play a role in the long-term goal of reducing emissions.

Sincerely,

Cassandra Cotton
Vice President, Policy & Programs
Fertilizer Canada